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The mechanism of laser induced desorption has been investigated by comparing the wavelength and pulse energy dependence of laser desorption from thermally thin metal films of a variety of thicknesses. We are able to distinguish thermal versus non-thermal laser desorption mechanisms.			
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Kinetics of Surface Reactions Studied by Laser Desorption with FTMS Detection

The use of thin metal films of various thickness as substrates provides a way to experimentally distinguish thermal and nonthermal mechanisms in laser desorption experiments. Using this method, the mechanism for direct laser desorption of peptide negative ions has been shown to be wavelength dependent. When 351 nm radiation is used, the desorption proceeds via a thermal mechanism. When 248 or 193 nm radiation is used the desorption mechanism is clearly shown to be non-thermal. Direct photoexcitation of the peptide does not appear to be important however, since the Gly-Ala and Gly-Phe-Ala show similar behavior at 248nm. A mechanism which involves electron excitation in the substrate followed by the hot electron transfer to the adsorbed peptide, as has been suggested for other adsorbate systems, may be operative at the shorter wavelengths. An important aspect of the shorter wavelength nonthermal process is that it results in substantially less fragmentation than is observed for the thermal desorption using 351 nm radiation.

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1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

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